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*Determination of the North Polar Distances and proper Motion of Thirty fixed Stars.* By John Pond, Esq. Astronomer Royal, F.R.S. Read June 15, 1815. [*Phil. Trans.* 1815, p. 384.]

In the former catalogue which the Astronomer Royal gave in 1813, he estimated the probable extent of error at not more than one fourth of a second; and his present catalogue, which may be presumed to be improved by a greater number of observations, confirms the justness of that estimate; since the greatest difference observable is not more than two tenths of a second.

A comparative catalogue is also given of the places of the same stars in 1756, as deduced from the observations of Dr. Bradley; and thence is added a column of annual proper motions for each of the stars in the collection.

*An Essay towards the Calculus of Functions.* By C. Babbage, Esq. Communicated by W. H. Wollaston, M.D. Sec. R.S. Read June 15, 1815. [*Phil. Trans.* 1815, p. 389.]

In the same manner as an exponent expresses one operation on quantity, namely, the multiplication of it by itself a certain number of times, or raising it to the power expressed by that exponent, so the term Function, which has been introduced into modern analysis, is intended to express generally the results of all the various operations that can be performed upon quantity. Many of these operations consist of two parts, the *direct* and the *inverse*. To extract a root is the inverse, with reference to that of raising any number to a higher power. So the *integral* is the inverse of the differential calculus; and the same observation applies to finite differences. In all these cases the inverse method is by far the more difficult of the two.

The author's object in the present essay is to consider the inverse method with respect to functions, and, if possible, to determine the value of an unknown function by means of any functional equation given, instead of discovering, as in the direct method, the value of a quantity from an equation in which the function is known. But the mode in which the author pursues his inquiry, of course could not admit of being publicly read.

*Some additional Experiments and Observations on the Relation which subsists between the Nervous and Sanguiferous Systems.* By A. P. Wilson Philip, Physician in Worcester. Communicated by Thomas Andrew Knight, Esq. F.R.S. Read June 15, 1815. [*Phil. Trans.* 1815, p. 424.]

This paper comprises a series of very numerous experiments on the effects of various stimuli applied to the brain and nerves of rabbits and frogs, in exciting the voluntary muscles, the heart, and the blood-vessels; from which the author infers,—